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ABSTRACT

A series of technical reports based on the Aloha System for educational computer programs provide a background on how various countries in the Pacific region developed computer capabilities and describe their current operations, as well as prospects for future expansion. Included are studies on the Japan-Hawaii TELEX and Satellite; computers at Institut Teknologi Bandung; and experimental radio-linked computer communication system in Taiwan; the Pacific computer network in Korea; and educational computing in New Zealand. References and sources of information are provided in each report. (SK)

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A JAPAN-HAWAII COMPUTER NET -- TELEX AND SATELLITE

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Abstract

Recently, the study on computer network has developed rapidly and its achievement have become a center of wide interest. In this paper, we describe a Japan-Hawaii computer network, a Telex link and a Telex-Satellite link. At present, the Telex link is used instead of the radio UP link for data-transmission because of the license in Japan.

1. INTRODUCTION

In recent years, The ALOHA System which is constituted with the host computer IBM 360/65 in University of Hawaii, terminals in Hawaiian Islands and the telex terminal located in Tohoku University, also in Alaska, has been developed.
On the participation of Japan to this ALOHA System, there are some contraints. In this system, the satellite ATS-1 is used for the radio link.
The frequencies to Japan are 149.22 MHz for UP link and 135.6 MHz for DOWN link, but at present, it is difficult to send the frequency for UP link because of license in Japan. However it is easy to receive the frequency for DOWN link. So one communication line from Japan to Hawaii through the wire is needed, therefore this one way to Hawaii is formed by not the radio link but such as Telex line.
In this paper, the Telex link is used for UP link and the radio link is used for DOWN link respectively as shown in Figure 1. This transmission speed is 10k baud and the modulation system is the phase shift keying.

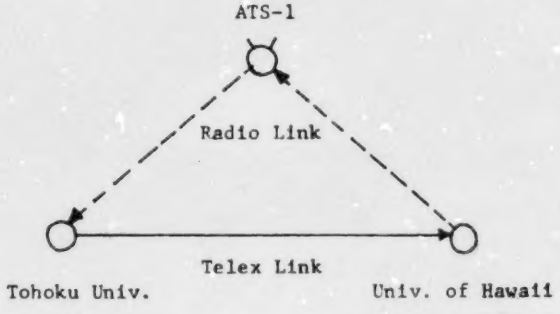

Figure 1. Telex and Satellite Link

2. TELEX LINK

The telex is a worldwide switched, public teleprinter communication system and operates at rate of 50 baud. The configuration of the Telex link developed for The ALOHA System is shown in Figure 2. In this system, there are some constraints in terms of the technique and the communication rule. For instance, the telex code of NTT and KDD is different from that of international telex, and these are different from ASCII code used in The ALOHA System. Moreover one character consists of the six units in NTT code, the five units in KDD

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code and the eight units in the ASCII code. Applied characters in this system are shown in Table 1.

TELEX CODE	ADDITIONAL CODE	
	TELEX	ASCII
0	'.'	*
1	'?'	$
2	'A'	@
)	':'	;
9	'U'	↑
A	'P'	Z
)	'I'	!
Z		
CR		
LF		
;		
:		
'		
)		
(		
+		
-		
/		
=		
?		

Table 1. Character Codes

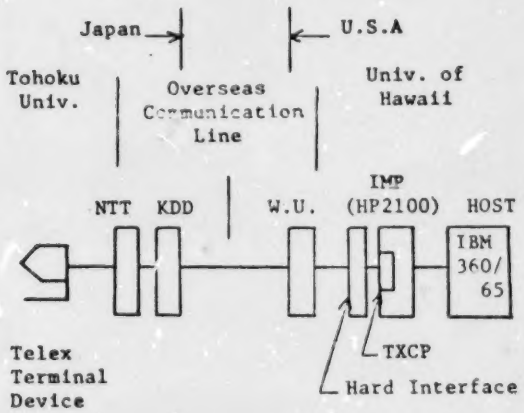

Figure 2. Configulation of Telex Link

In order to complete our Telex-Computer communication system, we have provided the interface as follows.

Hardware Interface Unit; In the half duplex transmit or receive mode, this unit converts parallel data to serial data or serial data to parallel data and treats start and stop bits.

Software Interface Unit; This program module called telex control program (TXCP) consists of an output process module (TXOT), input process module (TXIP) and a code converter which converts input or output character codes into ASCII or telex codes.

3. RADIO LINK (DOWN LINK IN JAPAN)

The DOWN link of The ALOHA System in Japan used a radio link. Fortunately, The receiving of the electric wave for the DOWN link is not restricted in the license of Japan. Let us explain the radio link receiving system in Figure 3, exactly. The The electric wave from University of Hawaii through ATS-1 for DOWN link is received with the Yagi antenna system, where the frequency of this wave is 135.6 MHz and the modulation system is FSK of ±8.25 KHz. In the receiver, the electric wave is demodulated, so that the packets of video signal is obtained. This video signal is transmitted to the RECEIVE DATA MODEM, where this signal are translated into the unipolar pulses, and then the preamble and sync-code of each packet constituted with the pulse series are removed. Furthermore, when the packet have error of bits, the error is detected in this MODEM and then the pulse series are translated into the parallel on time, i.e., the serial-to-parallel conversion is done.
The output of the MODEM is transmitted to the IMP (MENEHUNE in Hawaii) constituted in the minicomputer (OKITAC-4300C) through the interface for connection between MODEM and IMP. In this IMP, the packets are ressembled for the message sent from University of Hawaii, moreover the messages are transmitted to the typewriter (Teletype) in order to output. For the radio link receiving system, the special software is needed because of the unique link, i.e., the telex line for UP link and radio link for DOWN link in Japan.
Let us describe the antenna system in Table 2. This antenna system is made in Japan for receiving the wave from the ATS-1. This system is set in Faculty of Engineering in Aoba campus. Next, let us describe the receiver set more exactly in Table 3. This set is made in Japan for special link, too. The MODEM is made by Nippon Electric Co. Ltd.

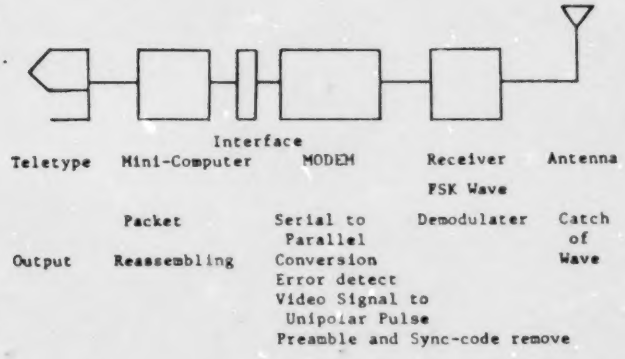

Figure 3. Configuration of the Radio Link Receiving System

System	8 element Cross Yagi Antenna
Wave Angle	4∼11 degree
Gain	11 dB
Directivity (F-B) Rate	greater than 15 dB
Input Impedance	50 Ω
VSWR	less than 1.2

Table 2. Antenna System Specification

Frequency	135.6 MHz
Modulation System	Phase Shift Keying (FSK)
Speed	10 kbits/sec
Output Voltage	+2 V (Video Output)
Output Impedance	10 kΩ

Table 3. Receiver Specification

4. CONCLUSION

The information from Japan to Hawaii is reverse to the above flow to receive, however the transmitter is not used because of the Telex link in this case. Although the transmission rate is very slow in speed in out case, it makes us easier to communicate with The ALOHA System from a distance about 6,200 km by use of our telex link. However, our main emphasis is an effort for many trials in the area of satellite data communications and many efforts are made in the direction.

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COMPUTER AT INSTITUT TEKNOLOGI BANDUNG : PROGRESS AND PROBLEMS

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Abstract

With the assignment of Bandung Institute of Technology (ITB) as one of five major universities to be developed into centers of excellence in Indonesia, and reiteration of its basic philosophy as being development oriented and development committed, the computer center was established in 1972. In this connection, activities of the computer center are directed toward serving education, research and public service. Attempts have been made to develop manpower, software as well as hardware capabilities, and to initiate future studies in computer science. Progress and development toward this goal is outlined. The possibility of ITB to join the Pacific Education Computer Network is discussed.

1. INTRODUCTION

Interest in the use of computer oriented techniques and effective use of computers for instruction, research, data processing and other applications has developed at Institut Teknologi Bandung since early 1960's, and in 1972 a Computer Center was established at ITB as the first computer center in Indonesian universities. The interest and appreciation in the effective use of computer has also steadily grown in Indonesia, in particular in the fields of data and information processing, but the capabilities and background are still limited. For a technological university oriented and committed to development, ITB should take steps in filling these gaps, which may contribute to needed changes .

In this conjunction, effort made at the University of Hawaii to develop a Pacific Education Computer Network can be regarded as an attractive solution to problems broader than computer utilization, and the idea of joining into the network need be pursued further.

The objectives of the present paper can thus be outlined as follows : (a) to present the progress and problems associated with the setting up of a computer center and computer science education at ITB, and (b) to discuss qualitatively the possibility of ITB to join the proposed computer network.

2. THE STATUS OF COMPUTING AT ITB

2.1 BACKGROUND AND PROGRESS

The idea, effort and interest in organizing the computer center and initiating computer sciences study at ITB cannot be separated from the basic foundation that determines the course of action being followed by ITB. Following a basic memorandum issued by the Directorate General of Higher Education in 1967, in which it was pointed out that the role of the institution of higher learning had to be one of " agent to modernization and development", several steps have been taken. To reach this objective, more attention had to be paid to the qualitative aspects of higher education, which is crucial since higher education must provide the society with leadership and high level manpower. In this context, research in the universities is considered vital for national progress and economic development. Starting in 1971-

1972, five out of 40 state universities were selected to be developed into "centers of excellence". The selection was based on: (a) academic standing, (b) possibilities for interdisciplinary studies and research, (c) potentiality for innovation and experimentation, (d) capacity to extend their excellence to other universities, (e) prospects of better and quicker returns from investment of limited resources, and (f) sphere of influence in terms of students, teachers and academic diciplines. Institut Teknologi Bandung is one of the five selected universities. In its masterplan that covers ten years development plan, 1971-1981, ITB reiterated that as a house of learning, ITB should be development oriented and development committed. To implement the masterplan, reorganization of ITB has taken place and a four year curriculum geared to educating graduates oriented toward the development of Indonesia has been adopted. Within the framework of ITB's organization, the computer center is regarded as a central facility, which provides computer and educational services. The computer center performs the following functions: (1) to provide data processing services for ITB's administration, (2) to provide computer services for instruction and research, (3) to develop computer capabilities within ITB and to initiate efforts leading to computer science education at ITB, and (4) to provide public service in the field of computer and data processing. At present, the computer center is organized into two divisions, i.e. the production division and the computer science division. Efforts leading to the establishment of the computer center was initiated in 1969, and the center materialized when Pertamina presented ITB with an IBM 1401, which was phased out in view of its new acquisition of a more powerful IBM 360/40. Although no feasibility study has been conducted with regards to suitable computer at that time, it was envisaged that the IBM 1401 would be useful in serving the following objectives: (a) to promote computer activities and the use of computer oriented techniques at ITB, (b) to develop manpower, software and operating capabilities, and (c) to disseminate computer application techniques to a larger group of users in Indonesia through ITB's graduates and affiliates.

2.2 INTEREST

The interest in the application of computer oriented techniques and in the effective use of computer at most departments at ITB is enhanced by the presence of computer facility at ITB and the adoption of the new curriculum. This growth has been indicated by the number of programming and numerical analysis courses offered (from 2 in 1969 to 11 in 1973), the number of staff members involved in computer application, and the number of students working on computer aided projects (from a few in 1969 to 41 in 1972). The computer load within ITB is estimated to be 4100 hours per year CPU time on IBM 1401, which consists of 1400 hrs for instruction, 500-1500 for research, 100 for upgrading courses and 1100 for ITB's administration. Since the installation of the IBM 1401, the monthly load has reached 180 hours. Further increase is difficult to obtain due to machine limitation. The estimated load may increase significantly with the availability of more powerful computer. Various groups of staff members at ITB have also been involved with the planning of computer systems of national scope elsewhere.

2.3 NEED

With the increasing interest in the application of computer oriented techniques, the need for manpower and trained personnel in computer science is eminent. There is also a need for a more extensive campaign on how and why a computer can be effectively used in wide areas of applications. There is need for a larger computer, possibly with a capability of IBM 370 or similar machines.

2.4 CAPABILITIES

Most of some 400 faculty members of ITB obtained advanced training in the US, Europe or Australia, and some 40 faculty members have considerable experience in using a computer, which were related to the application of computers for scientific purposes. At present Fortran is the only language widely known and used at ITB. The Autocoder is also

used for data processing with the IBM 1401. The mathematics department is using an HP 9200 for statistical analysis. The electrical engineering department has a strong interest and capabilities in computer hardware and related aspects, such as microwave and electronics.

Most computer installations are located in Jakarta, which has some 18 computer installations. Bandung has two computer installations; the other computer installation is an IBM 1401 with 4K of memory, while the one at ITB has 16K of memory.

2.5 COMPUTER SCIENCE EDUCATION

With the establishment of the computer science division at ITB's computer center, several activities have been carried out: (1) computer programming upgrading course for staff members, (2) lecture series in computer application and computer oriented techniques, (3) training of students and staff members to develop capabilities in numerical analysis and other fields of computer applications, (4) providing support for staff members to encourage work associated with computer application, (5) issuing a bulletin to encourage and communicate work associated with computer science and computer application and (6) initiating effort leading to computer science education in the near future, such as recruitment of graduates for advanced training abroad in computer science. In these activities, the computer center is assisted by the Ford Foundation. The computer programming courses which were offered every semester have received wide interest from neighboring universities and research institutions in Bandung as well as in Jakarta. Within a radius of six miles around ITB campus, there are some eleven institutions of higher education, some fifteen research institutions and other advanced industrial establishments, which thus far rely on computer services and consultation from ITB's computer center.

3. THE POSSIBILITY OF JOINING PECN

3.1 INTEREST

The idea of Pacific Education Computer Network has a great appeal to ITB, and the notion that ITB, possibly along with other major Indonesian Universities to link up to the PECN is attractive due to the following aspects: (a) a link to a large computer network could be a better alternative than installing more powerful computer in each university, (b) a link to the network provides some solution to the immediate need for software support , (c) the proposed computer network may serve as a part of a broader networkthat serves information communication as well as educational communication via satellite.

3.2 TENTATIVE PROPOSED SET-UP

As an initial step toward joining the PECN, it is proposed that a computer terminal be installed at ITB as a terminal to computer link in the network. Two other major Indonesian universities that are located at a reasonable distance from the satellite communication station in Jatiluhur may also be involved. The other possibility of computer to computer link may also be developed in the future.

3.3 TELECOMMUNICATION FACILITIES

The telecommunication system in Indonesia is operated by the government owned telecommunication company, the "Perum Telekomunikasi". The satellite communication station in Jatiluhur, which is operated by ITT, at present has 132 voice channels and 2 TV channels. For data transmission, it has a capability of 2 K bits per second. In conjunction to the realization of a microwave link between ITB and the PECN, a microwave link from ITB to Jatiluhur is required.

4. CONCLUDING REMARKS

ITB has a strong interest and capabilities to develop a computer center for university instruction, research and data processing of national scope that serve a broader community of neighboring educational, research and industrial establishments.

Disregarding economical aspects such as cost, preliminary qualitative view indicated that the notion of ITB to join the PECN looks promising and needs further study.

AN EXPERIMENTAL RADIO-LINKED COMPUTER COMMUNICATION SYSTEM IN TAIWAN*

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Abstract

In this paper, we describe an experimental UHF radio-linked computer communication system which is now under development in north Taiwan area connecting the computing centers of National Taiwan University, National Chiao-Tung University and Telecommunication Laboratories. Because of mountain obstacles and our research interest, the radio link is operated in diffraction mode instead of using repeater. In addition to the presentation of the system description and updating experimental results, we will also describe the present status of computer ultilization and data transmission services in Taiwan in order to have a look into the future extension of the system.

1. INTRODUCTION

During the last few years, there has been a fast growing need of computer data processing in Taiwan. Presently, more than 40 computers of medium and small size and from various foreign manufacturers have been installed in about 35 data processing centers. About ninety per cent of them are geographically located in the northern part of the Island. According to the recent survey, most of the computing machines do not have efficient use. For this reason, teleprocessing and computer communication is becoming an urgent and important thing.

In Taiwan, teleprocessing is very popular since 1971. There has been a banking system, an air line reservation system, an IBM Remote Job Entry System, a CDC CYBER scientific research system, five inventory control systems, and several other information retrieval systems in regular operation by using data transmission facilities provided by TTA, the Taiwan Telecommunication Administrations. Those transmission facilities are limited only to voice-grade leased lines by point-to-point or multipoint connections. The data transmission speeds in use are now up to 4800 bps. The banking system consists of serveral hundreds of terminals widely spreaded over the whole Island and connected to a center furnished with an IBM 370/135 System through leased-line circuits operated at 600 bps. The air-line system is also widely spreaded over the Island and centrally connected with an UNIVAC-9400 computer system through 2400bps leased line. Serveral similar systems, for instance, the railroad ticketing system, power company billing system and other industrious management systems are under construction. The IBM RJE system is centered at a 360/40 multiprogramming system at Taipei city and teleprocessed by two IBM 2780 terminals in the city, one IBM 1130 computer located in Chung-li, 40Km away from Taipei, and one IBM 2770 terminal located in Hshinchu, 80Km

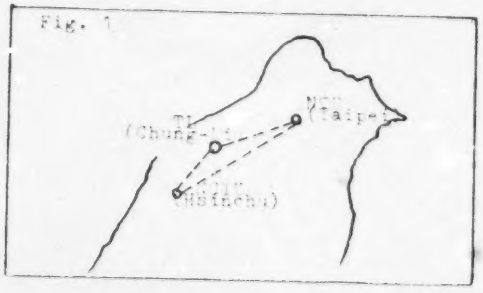
* This project is supported by The National Science Council, R.O.C..

away from Taipei through voice-grade dedicated lines at 2400bps. This system is for scientific and engineering data processing [1].
The TTA has completed the study of the possibility of providing dial-up data transmission services through its switched telephone network [2] and plan to put it into service in lately 1974. A public data processing service based on a CDC CYBER 72-12 system is planned to be in operation lately 1974. There is no wideband data transmission circuits in Taiwan. Although TTA has a plan to provide a dedicated 50Kbps circuit through FDM carrier system such as the groupband and the supergroupband, the equipment for equalizing the transmission line is complicated and costly, and the price for each bit becomes higher as the speed is increased. On the other hand, it has been made clear that more economical and effective data transmission is possible, for example, by digital radio system. For this reason, an experimental radio-linked computer communication system has been proposed and under developing since the Spring of 1973. The purpose of this project is to look into the possibility of constructing an economical and efficient northern Taiwan computer network. In what follows, we give a brief description of the system and its up-dating status.

2. THE SYSTEM

The system is to connect the three data processing centers located at National Taiwan University (NTU) in Taipei, National Chiao-Tung University, and Telecommunication Laboratories(TL) in Chung-li, about 40Km away from Taipei and also Hsinchu, as shown in Fig. 1.

Fig. 1



Because there is the need of high speed data link for computer communication and no existing wideband transmission facility, the system will be connected by experimental UHF digital radio links at frequencies 400.45 and 407.45 MHz. Furthermore, due to terrestial obstacles, the radio link is operated in diffraction mode.

The system layout is shown in Fig.2. Three HP 2000-series computers are used as CPU's for initial experimental basis. Both HP computers at NTU and TL have 16K memory and can support up to 16 hardwired terminals using time-share BASIC. The HP computer at NCTU is for temporarily use. A DEC-S/10 time-sharing system will replace it in the March, 1974. It will be the largest computing system among universities in Taiwan. Presently, there is a CDC 3150, an IBM 1130 and IBM 1620 system in the data processing center of NTU, TL and NCTU respectively. Terminal control unit (TCU) at each center constitutes a computer interface circuit which converts digital data from computer into series and high speed baseband data signal and a radio interface circuit which controls the RF carrier digitally frequency-shifted or phase-shifted. In our initial design, the HP computer at TL will not support TTY users as NCTU. It will only provide message switching and link NCTU and NTU. In this case, control software design at TL computer will be different from that at NTU and NCTU. The data format design will be packet type. They will randomly access to TL, as same as UHF burst random access communication method used in ALOHA System [3].

3. THE RADIO LINK

We have set up a radio-link between TL and NCTU based on a 25-Watt commercial UHF radio system of 12 voice-channel capacity. Although we can use data modem to convert high speed data signal into low frequency analog waveforms like conventional way, but we rather modify it to a digital radio link by interface hardware through pulse waveform coding techniques. The radio is opera-

ted in diffraction mode. Satisfactory transmission has been obtained recently by digital frequency modulation at rate up to 50Kbps. Fig.3 shows the diffraction profile between NCTU and TL[4]. The profile for link between NTU and TL is nearly the same.

4. FUTURE PROSPECT

The success of high-speed digital radio encourages us to develope the new and cheap digital radio transceivers which will reduce the system cost and increase the system reliability. Cheaper cost will attract more users to share computer resources of the system. We expect that the system can be extended to construct a computer network in northern Taiwan Island which covers the three major educational and scientific research communities in Taipei, Chung-li and Hsinchu.

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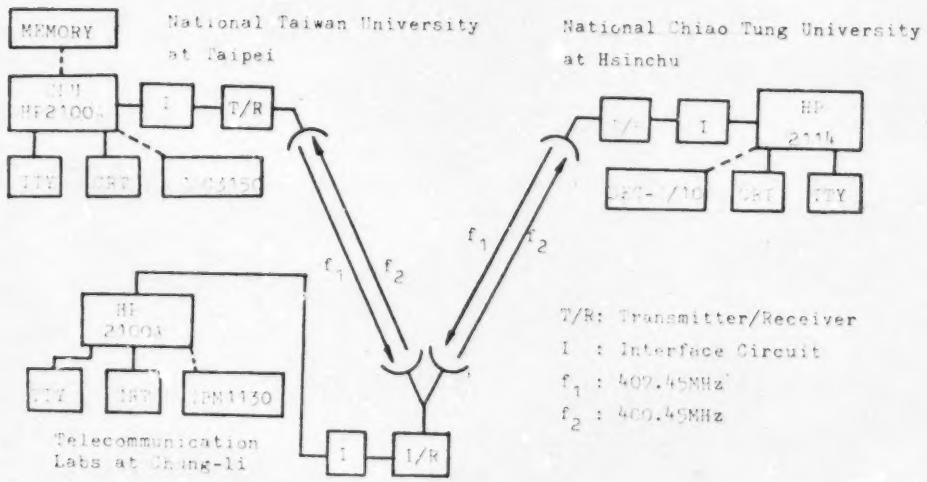

Fig. 2

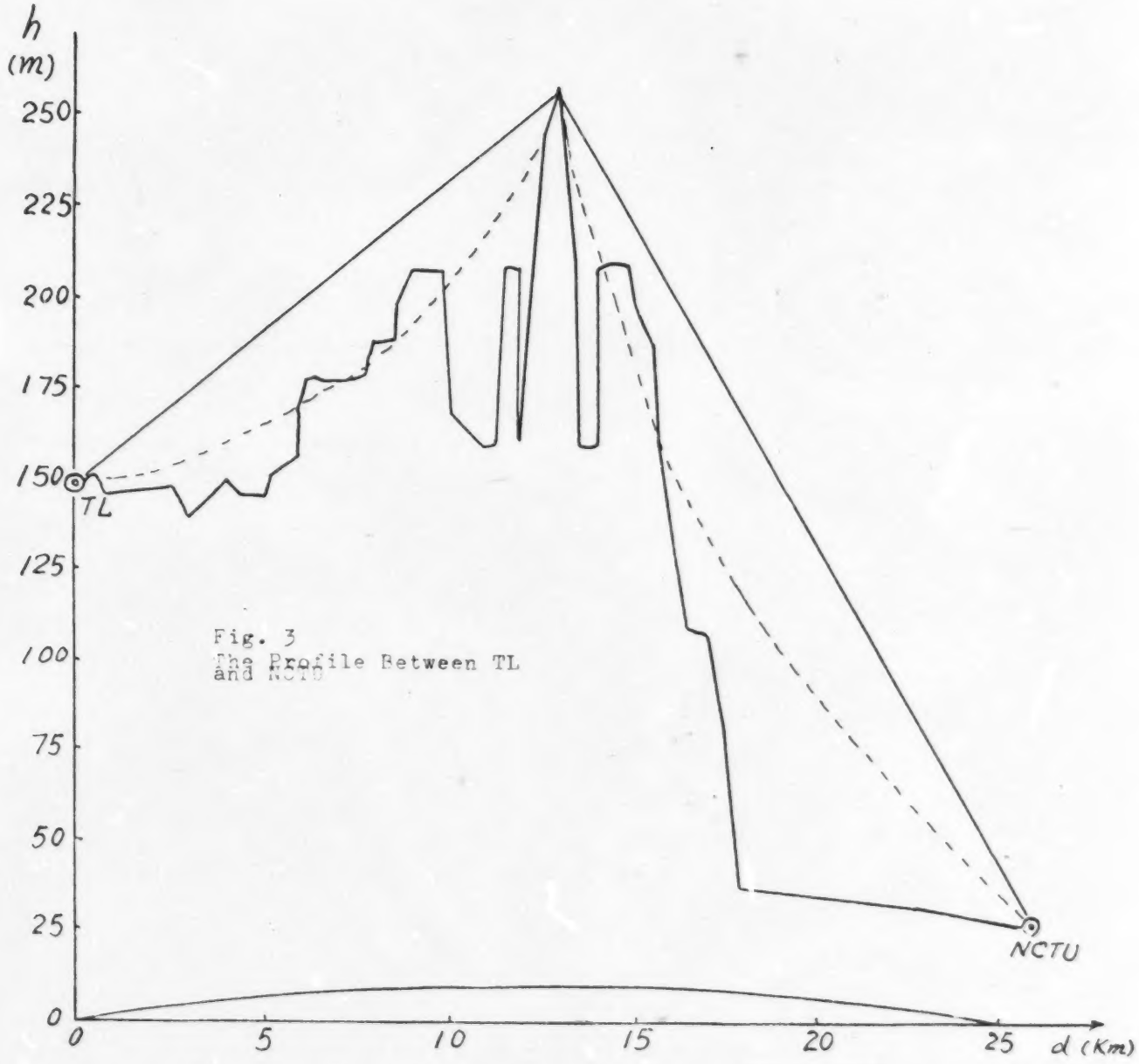

Fig. 3
The Profile Between TL and NCTU

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A PERSPECTIVE OF THE PACIFIC COMPUTER NETWORK IN KOREA

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Abstract

Advances in computers and computer networking in Korea are described. The efforts of the Korea Institute of Science and Technology (KIST) have been instrumental in the rapid development of the governmental, educational, and commercial computer networks. Transpacific linkages have been attempted but have experienced legal rather than technical difficulties. Communications are provided by domestic telephone service. A TELEX connection is being studied and a Pacific Computer Network for education and research is being looked forward to.

Since the middle of the 60's, Korea showed rapid economic development (over 10 percent per year) and it produced a lot of information to be handled, which left many problems to the people and economy when they were tried to be managed by hands and abaci. The application of computers, especially large computers, was inevitable in the end of the 60's.

In 1969, the first medium-sized computer in the country was installed at the Korea Institute of Science and Technology (KIST). In 1970, the computer group of the institute and budget officials of the government succeeded in developing and implementing an application of national significance, the Government Budget System (GBS). (See Ref. 1) GBS received Presidential interest and brought data communication and multi-programming into Korea earlier than expected.

In 1971, an application of even greater significance, the telephone billing system for the Ministry of Communication (MOC) utilizing Korean characters printer and optical input was developed by KIST. (See Ref. 2). Success of this project brought the OCR era to Korea and removed language barrier between Korean people and computer technology. (See Ref. 5). Use of native language since enabled wide application in government, banks, industry, universities, and research institutes. Use of OCR spread quickly from MOC to the Minsistry of Education (MOE) to handle various nationwide students' examinations. One application of MOE is handling of students' records of the radio correspondence school, whose 20,000 students are located all over the country and receive lectures by radio. The ALOHA project of Dr. Abramson may find application here when technology and cost figures are acceptable.

An experimental COBOL class in a Duksoo commercial high school sponsored by KIST came to the notice of MOE, which then supported a batch terminal operation at the school to make it a high school students' regional training center (1971).

Also, KIST has been engaged in various scientific applications in the fields of civil engineering, large scale simulations and electronic telephone exchange system.

To meet the rising demand, KIST has expanded its computing facility twice a year and, in late 1972, replaced its CPU from CDC 3300 to CDC CYBER 72. KIST's CYBER now supports a mix of four batch terminals and 7 interactive display terminals. The batch terminals are using leased lines. One of the display terminals is connected through dial-up telephone line and has proved that the existing dial-up telephone network of Korea is usable for computer networks at data speed of 300 BPS.

Besides KIST computer net, there is a banking network of Korean Exchange Bank (KEB) which operates for its 11 nation-wide branches using NCR Century 200 as nucleus (1973). KEB is using leased lines and microwave service of MOC for its data communication (1200 BPS). The Ministry of Home Affairs, Union Steel, and Korean Air Lines will have their on-line systems in 1974.

Having started with one in 1967, there are now 50 computers in Korea, and the number is increasing. Since Korea is importer of computers it will be desirable to take advantage of economy of scale by encouraging 2 or 3 competitive large scale computer nets in each special field of application such as banking, government, hospitals, educational and research institutes.

A transpacific computer link has been attempted twice. In 1970, KIST had tried to connect its CDC

3300 to CYBERNET via satellite link between Kumsan ground station, Korea, and Jamesberg, California. It was mainly to utilize a big linear programming package of CYBERNET, but the program itself was developed at KIST during administrative delay of the link project, so the need for the link vanished. In 1973, a USAID project team, headed by Dr. Carroll tried to establish a terminal-to-terminal data communication link between KIST and Michigan State University computers using dial-up telephone service. In both cases, there seems to be no major technical problems, but MOC of Korean Government objected this connection on legal grounds. However, MOC is currently serving U.S. Army data communication (2400 BPS) via satellite. KIST is asking MOC to specify the legal problem and solve it jointly if possible.

Domestic telephone system can be used for computer nets as mentioned earlier. KIST is now studying connection of TELEX network to KIST's CYBER net so that TELEX user can also use Cyber by just dialing KIST number. Since teletype in Korea is generally equipped with alpha-numeric plus Korean alphabetic character keyboard, success of this approach will clear ways to many applications. Thus, it may be said that Korea is not fully ready for a Pacific Computer Nets, yet, but the problems mentioned above will have been solved in 1975 or 1976. A Pacific Computer Net, then, if established for educational and research institutes, will be of much value to participants. On the other hand, it will create many new problems such as accounting. In earlier stage, it might be helpful to invite some international organization such as UNESCO or USAID for fundin, and organizational breakthrough.

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EDUCATIONAL COMPUTING IN NEW ZEALAND

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Abstract

This note sets out briefly the present situation of educational computing in New Zealand with particular reference to computing education and networking capability.

1. INTRODUCTION

This short note is intended as a companion to the paper by Professor J. Bennett on the South Pacific educational computing situation and deals specifically with the position of New Zealand. In some ways it extends the results of the questionnaire by Karen Ah Mai, undertaken in 1972, with respect to New Zealand data. It aims to present the present position with particular reference to education in computing and to networking capability.

2. COMPUTING IN NEW ZEALAND UNIVERSITIES

Over the last two years the seven New Zealand University institutions have had their computing resources significantly up-graded by the installation of five Burroughs B6700 medium-size computers at the five larger institutions (Auckland, Massey, Wellington, Canterbury, and Otago) together with remote-job-entry terminals at the two smaller (Waikato and Lincoln College).

Before the installation of these machines, the universities had access to machines ranging from IBM 1130's to an IBM 340/44 and personnel resources were at appropriate levels. Some of these machines have been retained.

The five B6700 machines are minimal configurations, of 64000-80000 word core, fixed-head disk and some peripheral devices. Each machine has limited data communications capability and the installations vary in the amount of data communications implemented at this time (January 1974) but plans for terminal systems are under way at most installations.

In most cases the significant change in computing capability has led to difficulties in staffing and financing the new installations, most effort is being expended on improving the batch-processing and customer service capability of the computing centres.

3. OTHER EDUCATIONAL INSTITUTIONS

All other educational institutions in New Zealand are, for the purpose of computing, under the more-or-less direct control of the Department of Education. At the secondary school level a large amount of computing is being carried out using a porta-punch card Fortran system designed at Otago University and implemented on a number of computers owned by the New Zealand banking institutions and being distributed throughout the country. The Technical Institutes in the major centres have access to an ICL 1904A computer at a government computer centre in Wellington via 1200 or 2400 baud lines from Remote Job Entry terminals in Auckland and Christchurch. Computing resources for these institutions are being reconsidered at the moment.

4. OTHER DEVELOPMENTS

Education in Computing. Three of the universities have Departments of Computer or Information Science and have formal programmes at either undergraduate or graduate levels, the others all have computing in some form within other educational programmes. Courses at the Technical Institutes are more commercially oriented, including full-time programming and system-analysis courses. Some hardware-oriented courses are also held at the Technical Institutes and in the Electrical Engineering Departments at Auckland and Canterbury Universities.

Networking. It was hoped at the time of purchase of the five university machines that these could eventually be linked for load and resource sharing. No plans for this are yet developed. As mentioned already some local remote-access systems are both planned and in operation, the most significant being the 100-mile 2400 baud link between Auckland and Waikato Universities. There are some government and commercial remote access networks operating at this time and in one case there is a 40 k baud link between computers operated by the banks.

5. CONCLUSION

The educational institutions in New Zealand are in a period of rapid development in computing resources and are technically well advanced in traditional areas of computing. There is some interest but little practical experience in linking computers in networks.

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